## Space Weather Forecast

Issued on Tuesday, 23 May 2023 at 13:11 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Chance of further R1/R2 radio blackouts likely. Chance of G1 Minor/G2 Moderate storm intervals Days 1-2.**

**Analysis of Space Weather Activity over past 24 hours**
**Solar Activity:** Solar activity has been Moderate with an isolated Moderate flare from a small sunspot region in the southeast disc that has subsequently decayed further. The most complex region in the northeast quadrant, consists of a wide train of small spots, and remains a magnetically complex spot despite some stabilisation and gradual reduction in spot numbers.

The large spot in the southeast, has seen some surrounding spots develop in the last 24 hours but remains stable. Despite this, activity has remained limited. The other regions are all smaller and relatively simple. A weak CME (coronal mass ejection) was produced by the larger flare. This has been analysed as missing, but likely passing close to the Earth 26-27 May. No other Earth-directed CMEs have been observed.

**Solar Wind / Geomagnetic Activity:** Solar wind speeds have been elevated at 500-600 km/s, perhaps due to a connection to the fast wind of a coronal hole. The total magnetic field strength was Weak to Moderate. The important north-south component was variable, but predominately negative (southward). Since around 23/0330UTC the important north-south component has been mostly positive (northward). Geomagnetic activity was mainly Unsettled to Active (Kp3-4).
**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

**Four-Day Space Weather Forecast Summary**
**Solar Activity:** Solar activity is expected to be Low to Moderate. The main risk region is in the northeast quadrant, which produced multiple Moderate flares in recent days.

**Solar Wind / Geomagnetic Activity:** There are no Earth-directed coronal mass ejections (CMEs), although a weak CME passing nearby may give a glancing influence at Earth late on Day 4 (26 May). Current elevated or strong solar winds are expected to persist Days 1-3 (23-25 May), waning Day 4 as influence from coronal hole fast winds wanes. Unsettled to Active (Kp3-4) geomagnetic activity expected with a chance of G1/Minor Storm intervals (Kp5), mainly Day 1 but perhaps Day 2 (24 May). Activity easing to mainly Quiet with Unsettled intervals (Kp0-3), and a chance of isolated Active (Kp4) spells by Day 4.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is forecast to be at background with no solar radiation storms occurring. There is a slight chance of count rates increase towards the minor storm threshold however, if any large flares occur.

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Met Office

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 40 | 20 | 1 | 5 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | Yes | 45 | 40 | 40 | 40 |
| Very Active | R3 to R5 X | No | 5 | 5 | 5 | 5 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 5 | 5 | 5 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |
| * S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$) | | | | | | |

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